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EXAMINER	
CHAN, HENG M	

ART UNIT	PAPER NUMBER
1793	

NOTIFICATION DATE	DELIVERY MODE
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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

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Office Action Summary	Application No.	Applicant(s)	
	10/590,291	TATSUMI ET AL.	
	Examiner	Art Unit	
	HENG M. CHAN	1793	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *27 February 2009*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1 and 11-24* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1 and 11-24* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☒ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

Status of Application

Applicant's amendment filed 2/27/2009 is acknowledged. Claims 2-10 have been canceled. Claim 1 has been amended and new claims 11-24 have been added. Claims 1 and 11-24 are examined on the merits.

Claim Objections

Claim 1 is objected to. It is suggested to rephrase step 2) as the following: "after adjusting the pH of the resultant mixed liquid to fall within the range of from 6 to 12, if the pH of the resultant mixed liquid is not within the range of from 6 to 12, adding a compound comprising magnesium and aqueous ammonia to form a precipitate comprising at least magnesium and element A." "A solution" in line 2 of step 3) should be changed to "the solution." "A pH" in line 1 of step 4) should be changed to "the pH." The subscript g is mis-typed as "q" in the 4th line from the last.

Claims 1 and 11 are objected to because subscript c in formula (2) is referred to as c' when discussing the atomic ratio of each element. For examination purposes, c' is considered as c.

Appropriate corrections are required.

Claim Rejections - 35 USC § 112

1. The following is a quotation of the second paragraph of 35 U.S.C. 112:

> The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

2. Claim 1 is rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention. Step 1) recites a pH of 8 or more, while step 2) recites a pH range from 6 to 12. This creates confusion whether the pH should be increased or decreased to get to range 6 to 12 after step 1). For examination purposes, the instant claim is interpreted to adjust the pH to 8 or more for both step 1) and step 2).

Claim Rejections - 35 USC § 103

1. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

2. Claims 1, 11-12, 14, 16-18, 20-22, and 24 are rejected under 35 U.S.C. 103(a) as being unpatentable over WO 00/71248 to Kuroda et al. (US 6,777,369 used as an English equivalent), in view of US 4,273,745 to Laferty et al. and US 5,002,740 to Cheresnowsky et al.

Regarding claim 1, 16-18, 20, and 24, Kuroda et al. teach a method of recovering molybdenum, comprising:

1) Dispersing a molybdenum-containing material which comprises at least molybdenum, element A which is selected from the group consisting of phosphorus, arsenic and mixtures thereof, and element X which is at least one element selected from the group of potassium, rubidium, cesium, and thallium, in water and adding alkali metal compounds and/or ammonia solution (**also as per claim 18**) to adjust pH to 8 or more (**also as per claim 17**);

2) Forming a precipitate comprising at least molybdenum and an A element by adjusting the pH to 6.5 or less, and

3) Separating the precipitate from the solution to obtain a recovered molybdenum-containing precipitate,

wherein the molybdenum-containing material, which comprises at least molybdenum, element A and element X, is a spent catalyst used in a reaction for producing methacrylic acid through gas-phase catalytic oxidation of methacrolein (**as per claim 16**); and

wherein said molybdenum-containing material has a composition represented by the following formula (2):

$$A_aMo_bY_cCu_fV_gX_dO_e \quad (2)$$

wherein,

Mo, Cu, V and O represent molybdenum, copper, vanadium and oxygen, respectively;

A represents phosphorus and/or arsenic;

Y (i.e. Y' of the instant claim) represents at least one element selected from the group consisting of iron, cobalt, zinc, magnesium, barium, chromium, tungsten, manganese, silver, boron, silicon, gallium, germanium, antimony, bismuth, tantalum, zirconium, selenium, tellurium, lanthanum and cerium;

X represents at least one element selected from the group consisting of potassium, rubidium, cesium; and

subscripts a, b, c, f, g, d and e represent an atomic ratio of each element, respectively; when b is 12, a is in the range of from 0.5 to 3, c is in the range of from 0 to 3, f is in the range of from 0 to 2, g is in the range of from 0.01 to 3, d is in the range of from 0.01 to 3, and e represents the atomic ratio of oxygen necessary for fulfilling the requirement of the valence of each element above, and (c + f + g) is in the range of from 0.02 to 3 (see from column 2, line 38 to column 3, line 1 and claim 5).

Kuroda et al. do not expressly teach the removal of A element by adding a compound comprising magnesium and aqueous ammonia to form a precipitate comprising at least magnesium and element A before forming a precipitate comprising at least molybdenum by adjusting pH of the thus-obtained molybdenum-containing liquid to 3 or less and separating the precipitate to obtain a recovered molybdenum-containing precipitate.

Laferty et al. also discloses a method of recovering molybdenum from an ammonium molybdate solution comprising the steps of:

1. Providing an ammonium molybdate solution containing at least molybdenum, phosphorus (element A), and alkali metals such as potassium (element X) (Table IV) that has a pH value between about 7 and about 10 (column 2, lines 64-65);
2. Adding at least one precipitant consisting of a water-soluble compound of at least one metal selected from the group consisting of aluminum, calcium, iron and magnesium, e.g. magnesium sulfate (**as per claim 20**), to precipitate the phosphate anion (column 2, 18-26 and column 4, lines 24-27);
3. Separating the phosphate precipitate from the ammonium molybdate solution (column 1, lines 59-60); and
4. forming a precipitate comprising at least molybdenum by adjusting the pH of the ammonium molybdate solution to between about 2.5 and about 4.5, e.g. 3.0 in Example 1, and separating the precipitate thus formed from the solution, to obtain a recovered molybdenum-containing precipitate that is free of element A (**as per claim 24**) (column 5, lines 16-20).

Therefore, it would have been obvious to one of ordinary skill in the art at time of invention to modify the method provided by Kuroda et al. by incorporating a step of forming and then removing the precipitate of at least magnesium and element A, followed by recovery of molybdenum precipitate by adjusting the pH to 3 or less as demonstrated by Laferty et al., motivated by the fact that Cheresnowsky et al., who teach purifying molybdenum containing arsenic and phosphorus by adding a source of magnesium to precipitate magnesium ammonium phosphate and magnesium

ammonium arsenate from an ammonium molybdate solution (abstract), disclose that phosphorous contaminant in molybdenum causes undesirable effects in downstream processing or applications, e.g. a decrease in the rolling efficiency of molybdenum (column 1, lines 23-26).

Regarding claim 11, Kuroda et al. teach a method for producing a catalyst suitable for producing methacrylic acid through gas-phase catalytic oxidation of methacrolein, comprising:

1) providing a recovered molybdenum from claim 1 as a molybdenum raw material (column 4, lines 22-23), and preparing a solution or aqueous slurry,

2) adding other raw materials containing Cu, V, A element, element Y and element X to the solution or slurry, and then adding an amount of ammonia to give a raw catalyst solution or slurry ,

3) drying the raw catalyst solution or slurry to give a catalyst powder, and

4) molding the catalyst powder, and calcining (Examples 1-2);

wherein said catalyst has a composition represented by the following formula (2):

$$A_aMo_bY_cCu_iV_gX_dO_e \quad (2)$$

wherein,

Mo, Cu, V and O represent molybdenum, copper, vanadium and oxygen, respectively;

A represents phosphorus and/or arsenic;

Y (i.e. Y' of the instant claim) represents at least one element selected from the group consisting of iron, cobalt, zinc, magnesium, barium, chromium, tungsten,

manganese, silver, boron, silicon, gallium, germanium, antimony, bismuth, tantalum, zirconium, selenium, tellurium, lanthanum and cerium;

X represents at least one element selected from the group consisting of potassium, rubidium, cesium; and

subscripts a, b, c, f, g, d and e represent an atomic ratio of each element, respectively; when b is 12, a is in the range of from 0.5 to 3, c is in the range of from 0 to 3, f is in the range of from 0 to 2, g is in the range of from 0.01 to 3, d is in the range of from 0.01 to 3, and e represents the atomic ratio of oxygen necessary for fulfilling the requirement of the valence of each element above, and (c + f + g) is in the range of from 0.02 to 3 (see from column 2, line 11 to column 3, line 1 and claim 10).

Regarding claim 12, Kuroda et al. teach using recovered molybdenum and ammonium paramolybdate (Example 1) as the molybdenum raw material.

Regarding claim 14, Kuroda et al. teach heating a mixture containing the recovered molybdenum and other elements to 95 °C (Example 1) and heating a mixture containing ammonium paramolybdate (without the recovered molybdenum) and other elements to 95 °C (Example 2). There is 0 °C difference between the two mixtures.

Regarding claims 21 and 22, Kuroda et al. teach holding the liquid for about 0.5 to 24 hours after adjusting the pH to precipitate at least molybdenum and element A (column 2, lines 60-65).

Although Kuroda et al. do not expressly teach holding the liquid for that amount of time after adding the compound containing magnesium and aqueous ammonia or after adjusting the pH of the recovered molybdenum-containing liquid, it would have

been obvious to one of ordinary skill in the art at time of invention to hold a similar reaction mixture for the taught amount of time and obtained predictable results by allowing a complete precipitation, whether the precipitate contains molybdenum and element A or magnesium and element A, and a thorough digestion of the material using acid or base in order to form the desired precipitate after the pH adjustment.

3. Claims 13, 15, and 19 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kuroda et al., Laferty et al., and Cheresnowsky et al. as applied above, in view of US 4,814,305 to Kamogawa et al.

4. Regarding claim 13, Kuroda et al. teach using 13.57 parts of 25 mass % ammonia solution in the preparation of a Mo_{12} compound (Example 1).

Kuroda et al. do not expressly teach using 1 to 17 moles of ammonia per 12 atoms of molybdenum. The absence of such a specific teaching would clearly suggest to the skilled artisan that any conventional number of moles of ammonia can be used per 12 atoms of molybdenum. In view of this, one skilled in the art would have found it obvious to

Kamogawa et al. relates to a method of regenerating a phosphorus-, molybdenum- and alkali metal-containing catalyst which has been spent in the production of an unsaturated carboxylic acid by vapor-phase oxidation of an unsaturated aldehyde (column 1, lines 7-11). This spent catalyst appears to be very similar in composition to that disclosed by Kuroda et al. (column 2, lines 23-37). The disclosed method comprises treating the catalyst with generally up to 100 moles of

aqueous ammonia, preferably from 6 to 60 moles, per 12 gram atoms of molybdenum (column 2, lines 44-49).

It would have been obvious for one of ordinary skill in the art at time of invention to have used any known conventional number of moles of ammonia, such as that suggested by Kamogawa et al., and optimized the number of moles of ammonia per 12 atoms of molybdenum in the process provided by Kuroda et al., motivated by the fact that Kamogawa et al. teach that the function of the regenerated catalyst is inferior and this is caused conceivably by an undesirable complex compound formed when excessive ammonia is used (column 2, lines 50-54).

Regarding claim 15, Kuroda et al. teach heating a mixture containing the recovered molybdenum and other elements to 95 °C (Example 1) and heating a mixture containing ammonium paramolybdate (without the recovered molybdenum) and other elements to 95 °C (Example 2). There is 0 °C difference between the two mixtures.

Regarding claim 19, Kuroda et al. do not expressly teach oxidizing the catalyst by calcination in air, chlorination or hydrogen peroxide treatment before the alkali addition, or by chlorination or hydrogen peroxide treatment after the alkali addition.

Kamogawa et al. teach that when the catalyst is deactivated by reducing action, it can be regenerated effectively by treatment in the presence of hydrogen peroxide or ozone (column 3, lines 6-12).

Therefore, it would have been obvious to one of ordinary skill in the art at time of invention to add a step of oxidizing the totally or partially reduced catalyst by hydrogen peroxide treatment before the alkali addition in the method provided by Kuroda et al.,

motivated by the fact that oxidizing the reduced catalyst helps regenerate the catalyst and restore the elements into the desired oxidation state before the recovery process.

5. **Claim 23 is rejected under 35 U.S.C. 103(a) as being unpatentable over Kuroda et al., Laferty et al., and Cheresnowsky et al. as applied to claim 1 above, In view of US, 4,587,109 to Lyaudet et al.**

6. Regarding claim 23, Kuroda et al. do not expressly teach removing vanadium if present.

Lyaudet et al., who relate to recovering molybdenum, also teach the recovery of vanadium (abstract).

It would have been obvious to one of ordinary skill in the art at time of invention to have added a step to remove vanadium, if present, in the method provided by Kuroda et al., motivated by the fact that Lyaudet et al. teach that molybdenum and vanadium are metals close to one another in the periodic classification of the elements, which suggests difficulties in separation, and since the molybdenum must be very pure to be used in metallurgy, it must therefore be free from elements which contaminate it and which are essentially constituted by elements like vanadium and phosphorus (column 1, lines 24-44).

Response to Arguments

Applicant's arguments with respect to claims 1 and 11 have been considered but are moot in view of the new ground(s) of rejection. The raw material of the claimed

invention is the same as or similar to that of Kuroda et al. The recovered molybdenum is essentially free from element A according to the combined teachings of Kuroda et al., Laferty et al. and Cheresnowsky et al. Finally, Laferty et al. teach using ammonia in combination with a magnesium compound to treat a molybdenum compound similar to that of Kuroda et al. and Kamogawa et al., who teach a method of regenerating a catalyst that is the same or similar to that of Kuroda et al., provide a desirable number of moles of ammonia per 12 atoms of molybdenum and the reason why excess ammonia is undesirable.

Conclusion

Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to HENG M. CHAN whose telephone number is (571)270-5859. The examiner can normally be reached on Monday to Friday, 8:00 am EST to 5:30 pm EST.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Jerry Lorengo can be reached on (571)272-1233. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

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